

CLAIMS

What is claimed is:

1. An apparatus for producing hypochlorite and generating electrochemical power comprising:

5 an electrolyzer for generating hypochlorite and hydrogen in fluid communication with a source of brine and in electrical communication with a source of electrical energy, the electrolyzer having an electrolyzer outlet for spent brine solution, generated hypochlorite and hydrogen;

10 a separator for separating spent brine and generated hydrogen and hypochlorite in fluid communication with the electrolyzer outlet;

a fuel cell for generating electrochemical power in input fluid communication with a source of oxidizer and output electrical communication with a power handling module;

15 a hydrogen conduit for controllably transporting hydrogen separated by the separator to the fuel cell and a hydrogen storage system;

a hypochlorite conduit for removing hypochlorite separated by the separator from the separator; and

a brine conduit for transporting brine separated by the separator;

2. The apparatus of claim 1, wherein the source of brine comprises:

20 a deionizer for deionizing water in fluid communication with a source of water; and

a salt saturator for producing brine from the water deionized by the deionizer.

3. The apparatus of claim 1, wherein the electrolyzer comprises at least one
25 electrode stack of interleaved anode plates and cathode plates separated from one another in each stack by one or more electrically non-conductive partitions separating said electrode stacks from one another, the electrode stack connected to the source of electrical power.

4. The apparatus of claim 1, further comprising an element for controlling hypochlorite dosing.
5. The apparatus of claim 1, further comprising a hypochlorite storage for receiving and storing hypochlorite removed from the separator.
- 5 6. The apparatus of claim 1, wherein the hydrogen storage system is further comprised of a compressor that is coupled to a plurality of storage vessels structured to contain hydrogen.
7. The apparatus of claim 1, wherein the power generation module is further comprised of an electrical converter that is electrically coupled to an electrical load
10 that receives the electrical energy of the power generation module.
8. The apparatus of claim 1, wherein source of oxidizer provides atmospheric air.
9. The apparatus of claim 1, wherein the electrolytic production unit is further comprised of a vent in fluid communication with the electrolytic production unit.
10. The apparatus of claim 9, wherein the electrolytic production unit is further
15 comprised of a non-combustible gas source in fluid communication with the electrolytic production unit.
11. The apparatus of claim 9, wherein the electrolytic production unit is further comprised of a controller to operate the flow of non-combustible gas into the electrolytic production unit.
- 20 12. The apparatus of claim 9, wherein the electrolytic production unit is further comprised of a vacuum source in fluid communication with the electrolytic production unit.
13. The apparatus of claim 1, wherein the separation of hydrogen is further comprised of a means of separating it from a non-combustible gas.
- 25 14. The apparatus of claim 1, wherein the separation of hydrogen is further comprised of a hydrogen purification subsystem.

15. The apparatus of claim 1, wherein the electrolytic production unit is further comprised of a dedicated water electrolyzer or plurality of dedicated water electrolyzers to be used in tandem.

5 16. A method for producing hypochlorite and generating electrochemical power comprising the steps of:

producing hypochlorite and hydrogen in an electrolyzer from brine received from a source of brine;

separating in a separator spent brine and generated hydrogen and hypochlorite received from the electrolyzer;

10 generating electrochemical power in a fuel cell using generated hydrogen and an oxidizer received from a source of oxidizer; and

directing generated hypochlorite from the separator to a hypochlorite storage.

17. The method of claim 16, wherein the source of brine comprises:

15 a deionizer for deionizing water in fluid communication with a source of water; and

a salt saturator for producing brine from the water deionized by the deionizer.

18. The method of claim 16, wherein the electrolyzer comprises at least one
20 electrode stack of interleaved anode plates and cathode plates separated from one another in each stack by one or more electrically non-conductive partitions separating said electrode stacks from one another, the electrode stack connected to the source of electrical power.

19. The method of claim 16, further comprising storing hypochlorite removed from
25 the separator to a hypochlorite storage.

20. The method of claim 16, wherein the electrolyzer comprises a vent for venting generated hydrogen in a gaseous phase to the separator.